

Description

Model Submarine Control/Propulsion System

BRIEF SUMMARY OF THE INVENTION

[0001] This is a completely functional 4 ft. Model Submarine. The working prototype has been developed and is shown in the attached pictures. The application is for the control/propulsion system used to make this submarine functional. The submarine selected for this prototype while resembling the Jules Verne submarine is significantly different. It does not have a movable rudder, it does not have a propeller, it does not have movable dive planes, it does not have any rivets, it does however have propulsion jets in the forward and rear sections of the submarine. The submarine itself could have been constructed from a PVC pipe 4 ft. long with tapered ends. The submarine hull shape is not important, rather the use of bilge pumps, ballast adjustment and radio control constitute the subject of this patent application.

- [0002] Unlike conventional RC boats and submarines this model has no propeller and no servos. It is entirely jet propelled using internal bilge pumps for propulsion and maneuvering. It is unique as a model submarine in that there are no external moving parts. It uses a dynamic ballast system in combination with forward and downward thrust for submerging. In other words the sub must be moving forward in order for it to dive. Otherwise, it has positive buoyancy and will remain on the surface. It turns, submerges, surfaces, and goes forward and reverse without any moving parts. The radio control system is unique as well in that there are no servos or other mechanical control devices, which are easily subject to failure. Electronic controls consist of solid-state electrical switches and automotive type relays.
- [0003] The sub submerges when the down pump in front pushes the front end down at a slight angle. In combination with forward thrust the sub will slip under the water at a gradual angle. Releasing the down pump will bring the sub to a level position underwater. Releasing all controls will bring the sub directly to the surface.
- [0004] The primary value of the product to a model submarine enthusiast is that the sub is very simple to operate since

the only moving parts involved are only the bilge pumps themselves and the fact that this submarine will not sink. Bilge pumps are readily available, relatively inexpensive and very dependable. They are ideal as miniature turbine units for a model submarine propulsion system.

DETAILED DESCRIPTION OF THE INVENTION

[0005] The submarine uses a dynamic ballast system for submerging. This means that in order for the sub to submerge it must be moving forward. The advantage of this type of system is that the sub will always surface when radio control is terminated. Additionally, forward speed is required to keep the sub underwater. In the event of a radio malfunction, or loss of signal, the sub will surface. As battery power diminishes the submarine slows down losing its ability to stay submerged. Forward thrust and sufficient power is required to submerge sub and keep it cruising underwater. Additional external ballast must be added to submerge the sub. For the additional ballast an external steal bar about 1/2" diameter and about 6" in length is mounted on the bottom as an adjustment to vary the angle and depth of submergence. Otherwise, without the external ballast, it has positive buoyancy and will remain on the surface. The ballast is used to lower the plane

of the sub to allow it to respond to the down submerge controls. Without this ballast the sub remains on the surface. This is useful when only surface control is desired. This can be in situations where the water is shallow or heavily weeded and could constitute an underwater snagging hazard.

[0006] Bilge pumps power the sub. These types of pumps are available at any marine supply store. The bilge pumps are located in the hull with four nozzles in the front and two in the back. The watertight chamber inside the submarine hull contains the radio receiver, solid-state electrical switches, and automotive type relays. This is a short piece of PVC pipe sealed at both ends with only the electrical wires protruding. The relays are controlled by the solid-state switches, which are plugged into the RC receiver. Power from the 12 volt sealed batteries goes into the watertight chamber and at the control of the operator is directed to the various bilge pumps for model operation. The bilge pumps are either on or off there is no proportional control and none is needed. The solid-state electrical switches are rated at about six amps. Automotive relays are added as a safety measure since they can handle 30 amps which are far more than the requirement for the

bilge pumps. The bilge pumps are either on or off there is no need to reduce voltage with an electronic speed control. The bilge pumps operate on 12 volts DC current.

- [0007] The 7ft working prototype submarine is the same as the 4ft except the batteries and bilge pumps are proportionally larger.
- [0008] Ballast is adjusted with interior foam and submerging ballast is fine tuned with the addition of external weight.
- [0009] Water continuously enters the sub's hull and the bilge pumps pump it out under pressure providing controlled thrust.